Name:

Enrolment No:

UPES
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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, December 2020

Course: Coal Bed Methane, Gas Hydrates & Shale Technology

Semester: II

Program: M. Tech PE **Time 03 hrs.**

Course Code: PEAU 8001 **Max. Marks: 100**

SECTION A [6x5=30marks]

1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / fill the correct answer(s)**

S. No.	**Question**	**CO**
Q 1	Fill in the blanks. a) Labile kerogen breaks down to generate principally liquid hydrocarbon …….. kerogen breaks down to generate principally gaseous hydrocarbons, and …….. kerogen generates no hydrocarbons but forms graphite. b) Type I kerogens are characterized by …….. initial hydrogen-to-carbon (H/C) ratios and …….initial oxygen-to-carbon (O/C) ratios. c) Type II kerogens are characterized by …….. initial H/C ratios and …….. initial O/C ratios d) Kerogen is ……..(soluble/insoluble) in normal organic solvents in part because of its ……. (high/low) molecular weight of its component compounds. e) Cannel coal is a variety of fine-grained, high-rank coal with significant …….. (oxygen/ hydrogen) content, which consists primarily of …….. (inertinite/ liptinite).	**CO1**
Q2	Mention the shale swelling effects on gas production.	**CO1**
Q3	Mention five characteristics of a Gas hydrate reservoir.	**CO3**
Q4	Explain types of cleats in CBM Reservoirs.	**CO2**
Q5	List five controlling parameters for shale gas production.	**CO1**
Q6	Differentiate shale oil and oil shale reservoirs.	**CO1**

SECTION B[5x10=50marks]

1. **Each question will carry 10 marks**
2. **Instruction: Write short / brief notes**

Q 7	Elaborate the composition and structures of gas hydrates. (10marks)	CO3
Q 8	Explain the benefits of using polystyrene-polymethyl methacrylate copolymer-graphene and Epoxy-Graphene composites dual-coated sand proppants for hydraulic fracture operations. (10marks)	CO2

Q 9	Discuss about drilling problems in shale reservoirs due to wellbore instability (10marks)	CO3
Q 10	Describe about gas storage capacity and gas flow patterns in CBM reservoir. (10)	CO4
Q 11	Elaborate the techniques for gas hydrate reservoir zone identification. (10)	CO4
	Section C **1. Question 12 carries 20 Marks.** **2. Instruction: Write long answer.**	
Q12	A coal formation is characterized to assess the gas generation potential using Rock Eval Pyrolysis. Where the free gas released at initial temperature 420° C, S1 is 4mg/g HC, pyrolyzed gas released is 2mg/g HC, S3 is 1.2 mcCO_2/g Rock, TOC =2 %, Tmax is 458 degree, (a) Calculate the Hydrogen Index, Oxygen Index and Production Index for that coal. (b) Interpret the thermal maturity zone and kerogen types. (c) Evaluate the gas generation potential. **(10+5+5=20)**	**CO5**
	OR	
Q12	(a) Create a workflow to describe the techniques involved in CBM exploration, drilling and completion. Describe all the techniques. (b) Analyze the recent advanced in CBM extraction processes worldwide. **(10+10=20)**	**CO5**